L4 Modelling Quadratics Using Vertex Form

1) Sketch the parabola, if possible

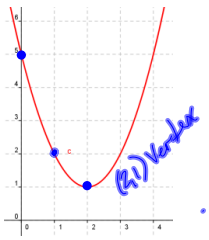
2) Identify the key properties

3) Sub vertex (h, k) into $y = a(x - h)^2 + k$
- if vertex is not given, use symmetry

4) Sub any other point to find a

5) Does your answer make sense?

Ex.1. Determine the equation in vertex form.



$y = a(x-h)^2 + k$

$y = a(x-2)^2 + 1$

Sub $(0,5)$ exact point

$5 = a(0-2)^2 + 1$

$5 = a(-2)^2 + 1$

$5 = a(4) + 1$

$5-1 = a(4)$

$4 = a(4)$

$\frac{4}{4} \quad \frac{}{4}$

$a = 1$

$y = (x-2)^2 + 1$

Ex.2 State the equation of the parabola obtained by applying these transformations to the graph of $y = x^2$.

1 - a vertical stretch by a factor of 5

2 - a vertical shift up of 9 units

$y = a(x-h)^2 + k$

No horizontal shift mentioned ∴ → does not exist

$y = 5(x-0)^2 + 9$

$y = 5x^2 + 9$

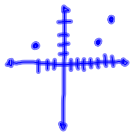
Ex.3 Write an equation for the parabola that has a vertex at (-3, 5), no zeros, and is wider than $y = x^2$.

$y = a(x-h)^2 + k$

$y = a(x+3)^2 + 5$

$-1 < a < 1$

Ex.4 Find the equation of the quadratic that passes through the points (-3, 2), (5, 2) and (7, 4).



$AOS = \frac{-3+5}{2}$

$= \frac{2}{2}$

$X = 1$

① $y = a(x-h)^2 + k$

$y = a(x-1)^2 + k$

sub (7,4)

$4 = a(7-1)^2 + k$

$4 = a(36) + k$

③ $4 = 36a + k$

② $y = a(x-h)^2 + k$

$y = a(x-1)^2 + k$

sub (5,2)

$2 = a(5-1)^2 + k$

④ $2 = 16a + k$

$4 = 36a + k$

$-2 = 16a + k$

$\frac{2}{2a} = \frac{20a}{20}$

$a = \frac{1}{10}$

sub $a = \frac{1}{10}$ into ④

$2 = 16(\frac{1}{10}) + k$

$2 = \frac{16}{10} + k$

$2 - \frac{16}{10} = k$

$\frac{20}{10} - \frac{16}{10} = k$

$k = \frac{4}{10}$ or $\frac{2}{5}$

$y = \frac{1}{10}(x-1)^2 + \frac{2}{5}$

Assigned Work: p. 280 # 1, 2ace, 3ace, 4, 5ace, 6cd, 7b, 8 (w/ diagram), 10, 15